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COST MANAGEMENT IN METALLURGICAL PRODUCTION

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Price changes in the global raw material markets significantly influence the economic characteristics of Czech metallurgical companies as well. This article illustrates the utilization of changeable market situation when purchasing of raw materials influence on significant cost savings. The possible use of technical analysis methods to achieve potential cost savings in metallurgical companies is illustrated on the prices of imports of Ferro alloys - FeTi to the Czech Republic.

Key words: metallurgical production, methods of the technical analysis, purchasing, cost savings

Trošak menadžmenta u metalurškoj proizvodnji. Promjena cijena na svjetskom tržištu sirovina značajno utječe na ekonomska obilježja metalurških tvrtki, pa i čeških. Ovaj članak ilustrira korištenje promjenjivosti situacije na tržištu kada kupovina sirovina utječe na značajne uštede troškova. Mogućnost korištenja metoda tehničkih analiza kako bi se postigle potencijalne uštede u metalurškim tvrtkama prikazana je na cijenama uvoza Ferro legure - FeTi u Češkoj Republici.

Ključne riječi: metalurške proizvodnje, metode tehničkih analiza, kupovina, ušteda

INTRODUCTION

The world's steel production reached 1,4 billion tons in 2010. In 2011, steel production should increase by another 5 %, according to the World Steel Association estimate and despite that, metallurgical companies still have problems trying to transform the increasing sales of products into profits.

In 2010, there was an agreement between the multinational corporations mining iron ore and the world's leading steel works in China and Japan, to change the supplies of iron ore from annual to quarterly contracts that are linked to spot market with iron ore. Although the metallurgical companies in the Czech Republic buy iron ore from Ukraine and Russia on the basis of longer-term contracts and their prices can show some stability, it can be assumed that the local mining companies will react to the development among the biggest iron ore mining companies. The price changes in global raw material markets significantly influence the economic characteristics of the Czech metallurgical companies as well.

The variable costs make up 60 to 80 % of total operating costs of metallurgical companies [1]. On the basis of this fact, we can conclude that the prices of input raw materials represent a key factor playing crucial role in the production optimization and cost cutting process [2].

Hence, there is a question *"Can we take advantage of the variable situation in the market on the side of purchases of raw materials in order to achieve major cost savings in metallurgical companies?"*

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TECHNICAL ANALYSIS

Commodities entering a metallurgical company, such as iron ore, coking coal, ferro alloys, etc., are currently traded in commodity markets (for ex. LME - London Metal Exchange), which is why the importance of prediction of future price development is significantly increasing. With regard to the possible fluctuations of prices in commodity markets caused, for example, by speculative purchases, global economic crisis, etc., it is very difficult to use conventional models based solely on analysis of historical time series, such as regression and correlation analysis.

Technical analysis represents one of the options for monitoring long-term trends and for predicting future development of prices of raw materials traded in the commodities markets. When combined with fundamental data, there can be a strong advantage in purchasing these materials compared to the competition. The technical analysis attempts to forecast prices by studying charts showing the past evolution. Charles H. Dow is acknowledged as the founder of the technical analysis. The technical analysis is a systematic method of analysing and evaluating the financial instruments which uses only the data produced by the market, such as price, volume, volatility and a number of open contracts. The development of technical analysis is also credited to R. N. Elliot. His theory of the Elliot Waves is very specific – it deals with the cyclical trend. Elliot says, that every growing trend consists of five rising waves (bullish) and three falling waves (bearish). According to Elliot, this is a typical pattern that repeats itself over time and he called it a cycle [3]. Currently, there are tens to hundreds of different formations and indicators which can

serve as the basis for businesses planning. A problem for many organizations which is that they often choose to measurement what is easy to measure instead of measuring what is right to measure [4]. Sufficiently detailed, clear and understandable definition of every indicator making impossible the ambiguity of interpretation is an essential prerequisite for the indicator to be sensibly implemented [5].

The basic methods of technical analysis include the simple moving average. The simple moving average shows the average value of data within the range of a certain time frame. The relation for calculation of the simple moving average (MA) is [6]:

$$MA = \frac{(P_1 + P_2 + \ldots\ldots P_n)}{n} \qquad (1)$$

P_n - closing price n – business day interval
n - number of days on the basis of which the simple moving average is determined

The basic strategy of the simple moving average method lays in the fact that every time the price crosses the simple moving average, it is considered to be a signal to enter or leave position, i.e. when the price crosses the simple moving average downwards, it means that it is a good time to sell. On the other hand, when the price crosses the simple moving average upwards, it means that it is a good time to buy [6]. Generally, the long simple moving average is suitable for monitoring long-term trends.

The trend-lines are among the oldest tools of the technical analysis [3]. The theory of this strong technical element is based on the fact that markets still tend to go in certain direction. These directions are bullish (rising) and bearish (falling) markets. Traders following the technical analysis use trend-lines in two ways, either to identify the direction of movement of the commodity prices, or to determine whether and when this movement changes.

EXPERIMENTAL PART

The possibility to use technical analysis, i.e. the simple moving average method for potential cost savings in the metallurgical companies is illustrated on the prices of imported ferro alloys FeTi to the Czech Republic, where certain cyclical nature of prices appears (Elliot Waves theory). Figure 1 shows the evolution of prices in USD/kg of significant ferro alloys - FeTi for the period of 1/2007 - 1/2011[1], including the composed simple moving average trend curves for six months. The data are drawn from the database of the Czech Statistical Office. As a result of the theory of the simple moving average method, the signal to purchase FeTi is the moment when the price crosses the simple moving average upwards (it enters the long position - long).

If the price crosses the simple moving average downwards, it is a signal to sell FeTi (it enters the short position - short). Through the use of MA, we can therefore appropriately time our entry into long or short positions and we can identify the right moment to purchase the required raw materials.

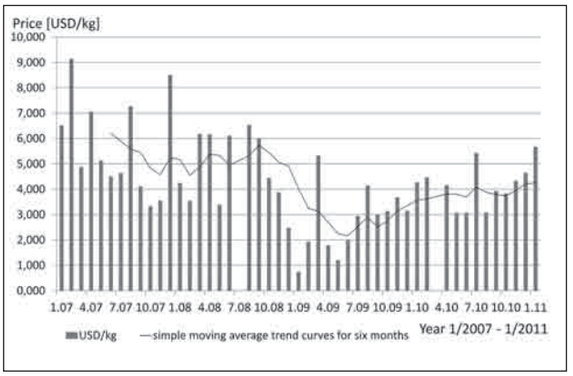

Figure 1 The evolution of prices of imported FeTi to the Czech Republic for the period of 1/2007-1/2011

The question of timing of the "right" point of purchase is also related to the question of how much raw material to buy so as to ensure a smooth production process run, while maintaining optimal rate of tied capital and acceptable level of risk.

Variability of demand for metallurgical products, which is caused not only by the ever increasing competition, but mainly by the recent global economic crisis, causes considerable fluctuations in demand for some input raw materials, especially iron ore. Sufficient quality prediction of demand for these input raw materials is very difficult in such a situation. A suitable solution could be to use the hybrid intelligent system, which is a combination of various methods of artificial intelligence with the techniques of dynamic simulation and conventional systems (for ex. the database systems) [7].

In case of inputs whose consumption is relatively uniform with no significant fluctuations, in metallurgical companies these are for example ferro alloys, it is possible to use (or even just to use it as one of the possible bases for making a decision) it to determine the quantity of the purchased raw materials, again by using the knowledge of the technical analysis - the trend-lines method. The information about the trend-line flow, its angle and length, can be used to forecast how long the period of growth and commodity prices may last and when the change of price movements is likely to appear and it can also be used to determine for how long the stock of a commodity should be created (period of commodity price growth against the purchase price) before its price changes (price reduction compared to the original purchase price).

RESULTS

The required quantity of FeTi for the period from Jan.2007 to Jan.2011 are 1 291 372 kgs. Possible purchase options:

1. Regular monthly purchase of the required quantity of raw material at current prices, see Figure 1.

[1] the database of the Czech Statistical Office 2011

Purchase costs of FeTi for the period of 1/07 -1/11 are 5 766 000 USD.

2. One-time purchase of larger quantity of raw material for longer period of time at current prices, see Fig. 1, at the moment set according to the technical analysis method:
   - Purchase in 1/2007 the amount of 68 600 kg for the price of 6 513 USD/kg
   - Purchase in 3/2007 the amount of 270 122 kg for the price of 4 878 USD/kg
   - Purchase in 10/2007 the amount of 560 458 kg for the price of 3 333 USD/kg
   - Purchase in 5/2009 the amount of 68 600 kg for the price of 6 513 USD/kg.?? (isn't accordingly to figure 1)

   Costs of the purchase of FeTi for the period of 1/07-1/11 are 4 103 000 USD.

   In case of this option, the costs must also include the so-called frozen financial funds that will be tied in the purchased inventories of raw materials at the interest of 6 %, i.e. 246 200 USD in the given period of time.

   The total costs of FeTi for the period of 1/2007-1/2011 are 4 349 200 USD. However, this option must also include the increased storage costs (these are not included in the calculations described above).

Comparison of the concrete costs of the options of raw material purchase being considered by us can help us to select such a purchase option that will contribute to cost savings in the metallurgical company. In such a situation, option 2 is preferable; the cost saving compared to option 1 is 24,57 %.

DISCUSSION

The example described above illustrates the possible use of the technical analysis methods for predicting the time of purchase and the amount of ferro alloys – input raw materials, which are characterized by a relatively uniform consumption in the manufacturing process and the prices of which have some sort of cyclical nature. The example is based on the re-evaluation of the development of prices, however you must realize that setting the appropriate moment and purchase volume in advance is always very difficult and, in case of real trading, the savings of costs would not be so optimistic.

On the basis of:

– Simple moving average method, you will have an opportunity to enter the long or short positions in the right time and to identify the suitable time of purchase (in terms of price) of the desired commodity

– Trend-lines method, you can predict how long the period of growth of commodity prices can last and when the price is likely to change.

The authors believe that if the management of metallurgical companies have the required information (valid with certain probability – it is a market where unexpected changes, such as speculative trades, may occur), they can decide about the appropriate options of purchase of raw materials and use the changing market situation to purchases input raw materials with significant cost savings. The success of the application of the technical analysis depends largely on the experience and skills of the analyst, which is why it can happen that two analysts will evaluate the same chart in a different way. It always depends on the experience of the technical analyst and his feeling for the markets. Technical analysis is therefore regarded as a "subjective art".

CONCLUSION

In the long run, it can be assumed that the prices of input raw materials for metallurgical companies will most likely rise. The main reason for that can be seen especially in the downward curve of availability of raw materials and the rapid growth of demand from countries such as China, India, Brazil and Russia (BRIC). The increasing demand for these raw materials is to go hand in hand with growing importance of prediction of future prices of raw materials for consumers and companies dealing with those commodities.

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